Reprinted from RADIATION RESEARCH, Volume 8, No. 6, June 1958
Academic Press Inc. *Printed in U.S.A.*

RADIATION RESEARCH **8**, 539–542 (1958)

Report on Amendments during 1956 to the Recommendations of the International Commission on Radiological Protection (ICRP)

When the International Commission on Radiological Protection met in Geneva in April, 1956, before the 8th International Congress of Radiology in Mexico in 1956, major amendments to the 1954 recommendations were adopted concerning the basic concept of maximum permissible radiation exposure levels. A report was sent to the Executive Committee of the Congress, stating briefly the most essential points in reports from the committees on special subjects. It was hoped that amendments to the recommendations published in 1955 would be made available within a short time, but, as detailed new information was continuously received and prepared by some of the committees, the final issue was deferred to make allowance for the most recent knowledge.

At present the Commission does not consider it possible to publish completely revised recommendations until the summer of 1958[1]. As, however, no official statement of the Commission has been issued since 1955, and the amendments made during the Geneva meeting are essential and imply substantial limitations of the maximum permissible exposure levels earlier recommended, the Commission has considered it advisable to promulgate the major points of the amendments which were adopted in Geneva.

A. Amendments to the Recommendations on "Permissible dose for external radiation." (To be read in conjunction with the 1954 recommendations as published in the *British Journal of Radiology*, Supplement No. 6, 1955)

Paragraph A.VI.1 reads unmodified concerning the exposure of *occupational workers*. For the definition of terms like "permissible" dose level the reader is referred to Chapter B of the 1955 recommendations.

For paragraph A.VI.2 the following two paragraphs were substituted:

2. *For population groups*

The recommendations of the I.C.R.P. formulated at its meeting in 1953 and published in 1955 dealt primarily with the protection of persons occupationally exposed to ionizing radiations and to radioactive material. The Commission recognized, also, its responsibility in regard to the protection of persons who might be exposed unknowingly in the neighbourhood of a

[1] The I.C.R.P. will meet in March, 1958, and it is very likely that its recommendations will then be further amplified.

plant or source of radiation, and recommended that "in the case of the prolonged exposure of a large population, the maximum permissible levels should be reduced by a factor of ten below those accepted for occupational exposure". It was envisaged at the time that in any practical case only a relatively small number of individuals in the immediate surroundings of an installation would be in the 10% zone and the bulk of the large population would receive much less radiation. It has come to the attention of the Commission that this provision may be misinterpreted and, therefore, a more explicit recommendation is now made in terms of "controlled" areas.

A *controlled area* is one in which the occupational exposure of personnel to radiation or radioactive material is under the supervision of a radiation safety officer.

For such personnel the maximum permissible levels of exposure are those specified for occupational exposure. In the case of prolonged exposure to radiation from external sources, the maximum permissible levels for occupational exposure are represented by weekly doses of 600 mrem in the skin and 300 mrem in the blood-forming organs, the gonads and the lenses of the eyes. In the case of prolonged exposure to radioactive material that may enter the body, the maximum permissible levels of exposure are represented by the concentrations in air and water given in Table C.VIII of the 1954 report of Sub-Committee II.

For any person in any place outside of controlled areas the maximum permissible levels of exposure are 10% of the occupational exposure levels. Under the conditions at present envisaged, the regions in which the 10% level might be reached would contain a very small fraction of the population and, therefore, the average organ doses per individual of the whole population would be very much lower than 10% of the maximum permissible organ doses for occupational exposure. (See also statement on genetic effects.)

3. *For the entire population*

The use of nuclear reactors for power production involves waste disposal and dispersion of radioactive material that may affect large sections of the population. The rapidly expanding use of radioactive materials in science and industry subjects more and more people to exposure to radiation. Therefore, genetic damage assumes greater importance. Designers of nuclear power plants and others concerned with the peaceful application of atomic energy cannot plan for the future in the present state of uncertainty as to what the genetic problem may mean in terms of a permissible level for the whole population. Realizing the importance and urgency of the matter, and cognizant of its responsibility to the public, the Commission has decided to accelerate its study of the problem in order to be able to recommend in the near future a maximum permissible "genetic dose" applicable to the whole population. In the meantime those concerned with the problem may be guided by the following statement:

When genetic aspects of the effects of radiation are considered, the dose received by the whole population is of importance. Scientific data derived from human as distinct from experimental animal populations are so scanty that no precise permissible dose for a population can, at present, be set. The available information is being assessed by the Commission and other groups including geneticists. Until general agreement is reached, it is prudent to limit the dose of radiation received by gametes from all sources additional to the natural background to an amount of the order of the natural background in presently inhabited regions of the earth.

The following sentence was added after item 3, on page 20:

4. In exceptional cases in which it is necessary for a person to receive in one week more than the basic permissible weekly organ doses, the unit of time may be extended to 13 weeks (¼

year), provided that the total dose in any organ accumulated during a period of any 13 consecutive weeks does not exceed 10 times the respective basic permissible weekly dose.

The following new sections were added to Chapter B, where the former Sections IV and V became VI and VII, respectively:

IV: *Statistically detectable effects*

The definitions of permissible dose and permissible weekly dose are based on possible bodily injury manifestable in the lifetime of an individual. Since any such injury to a particular person that might result from exposure at present permissible limits would be very slight, and in view of large biological variations that always exist, certain types of injury cannot be detected in a single individual. This is particularly true in the case of a possible shortening of the life span. Therefore, it becomes necessary to consider injuries that become significant only when large groups are examined statistically.

The recommended maximum permissible weekly doses and the modified values for special circumstances permit a desirable degree of flexibility for their application. In practice it has been found that in order not to exceed these maximum limits and also to comply with the general recommendations of the Commission "that exposure to radiation be kept at the lowest practicable level in all cases", a considerable factor of safety must be allowed in the design of protective devices and operating procedures. Therefore, under present conditions, it is expected that the average occupational dose actually received by an occupationally exposed person would be about 5 rems and the accumulated dose in the employment period up to 30 years of age would be about 50 rems. Accordingly, the Committee recommends continuation of the present conservative practice as regards doses actually received by occupationally exposed personnel, to keep the accumulated dose as low as practicable, especially up to age 30.

V: *Pregnant women*

Since it is known from animal experiments that the embryo is very radiosensitive, special care should be exercised to make sure that pregnant women are not occupationally exposed under conditions in which, through some accident or otherwise, they may be exposed to large doses of penetrating radiation. When the exposure cannot exceed the basic permissible weekly dose, however, no special provisions need be made.

B. Amendments to the Recommendations on "Permissible dose for internal radiation"

It was proposed that the maximum permissible weekly dose for occupational exposure continue to be 0.3 rem for all organs of the body with the exception of the gonads and the total body. In cases in which the gonads are the critical body organs, the maximum permissible weekly dose was reduced to 0.1 rem in order to limit the gonad dose to not more than 50 rems before the age of 30. This reduction was made with the intention of preventing damage to man during his most reproductive period. In the cases where the total body is the critical organ the maximum permissible weekly dose was again set at 0.1 rem. This reduction will limit the accumulated dose in the total body up to the age of 60 to not more than 200 rems and is intended to reduce the probability of damage resulting from total body

exposure, e.g., reduce the probability of leukaemia and reduce the possibility of shortening the life span of the individual.

Members of The International Commission on Radiological Protection presenting the report:

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November 11, 1957